RELEASE 1.0

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WAY OFF BROADWAY: THE 1994 PC FORUM
by Esther Dyson and Jerry Michalski

This is the playbill for the 1994 PC Forum. Each year we use the newsletter that falls in the same month as the Forum to present the featured players and think through the topics we wish to address at the Forum. It's a way for us to arouse your curiosity, get the juices flowing and kick off the interactivity that makes the Forum work. Think of this issue not as mere documentation, but as a launch pad for discussions and a tool to help you plan your approach to the Forum. Or maybe this is what documentation ought to be.

This year our theme is "Interactivity is two-way," and we've changed the name of the Forum to reflect it: The "PC" that originally stood for "personal computer" and later "platforms for computing" now stands for "platforms for communications." (We hope it's been politically correct all along.) The word "communications" indicates not only the increasing value of PCs as communication platforms, but also their increasing convergence with other communication platforms, most of which are far more mature than the PC.

It's an understatement that the information superhighway has drawn some attention in the US over the past year. The glare of the neon "coming soon" signs on the superhighway flickered a bit when Bell Atlantic and TCI hit their pothole recently, causing many of the vendors, carriers, media moguls and service organizations to rethink their positions. But interactivity is still real, especially in the business world. However, everyone defines it differently.

For example, telephones have always been interactive and have gained new features, such as voice response, transaction processing and speech recognition. But the phone system has found it difficult to get beyond its ⟹

SEE YOU IN PHOENIX THIS SUNDAY!

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own world view and redefine interactivity (AT&T's "You will" ads are one attempt to popularize the message, but they have a World's Fair atmosphere). Or take interactive tv: Is the ability to buy a tummy-toner or order Grateful Dead tickets with your remote control interactivity? Yes. Is it what we're looking to explore at this Forum? No.

Life beyond spuds

This year's Forum is about interactivity beyond the couch-potato model. It's about tools that facilitate communications and commerce, about the way corporations interact with their environments (including each other) and about how individuals interact in teams to pass wisdom and gain new insights. How explicit or implicit should constraints, rules and rights be in order to promote learning?

We will discuss the virtual places people inhabit, the roles they play and the rules they live by -- and help set. We'll explore how people form and stay in communities online and examine the commercial implications. How does person-to-person interactivity translate into profitable business opportunities, both for service providers and for organizations' own benefit?

When people connect through the electronic medium, directly or through an intermediary, they pass things of value. Today, it's hard for them to get paid for those transactions. Sometimes it's even hard for them to prove they have any lasting rights over them. What do online advertising and digital cash look like? How must the infrastructure change to facilitate electronic commerce? What rights and expectations do subscribers, technology vendors, carriers, service providers and government agencies have?

Three days in Phoenix

We've divided the Forum topics into three acts over three interactive mornings (even though the Forum is more collective performance-art than a stage play). In the first, we examine how the changing nature of the industry has affected the major players -- from IBM, Microsoft and Silicon Graphics to AT&T -- and vice-versa, in a two-way dance. We cap the morning with a discussion of the government's role in the infrastructure's design and regulation. This should be *very* interactive: Including panelists Ed McCracken and Esther Dyson, the Forum crowd includes four of the 27 NII Advisory Council members; the other two are Nathan Myhrvold of Microsoft and Mitch Kapor. That evening, science-fiction writer Bruce Sterling will explore another side of the information infrastructure.

The second day explores life on the net from social and commercial perspectives. How can online services foster communities? Do communities scale? Are they profitable? When we transact and interact online, what becomes of our privacy? How do we defend our intellectual property? Are our comments in cyberspace there for everyone's consumption and replication, or will new legal restrictions and forms of etiquette prevail? Are postings to a BBS more like phone calls, face-to-face conversations or physical mail?

The third day focuses on the broader role of the electronic infrastructure in organizational learning and activity. How do people and organizations learn? Can simulations help people do "what-if" analyses with complex systems, or is the experience of the simulation the point? How can you design

an online environment to be structured enough to provide a firm foundation for participants, yet loose enough that it nourishes the informal collaboration and storytelling that transmits useful knowledge? What do the design tools look like?

We also hope to learn ourselves: The Forum ends with a session in which we trade ideas with you about how **Release 1.0** should be manifest in the new media. What kind of role do (and could) we play in each others' lives? How can we heighten the interactivity?

As usual, on Monday and Tuesday afternoons we have companies presenting their concepts (see page 29) as well as a Rumpus Room where you can try out various technologies (with guides as copilots) to see what all the hoopla is about and plan new products or services (see page 35).

MONDAY: THE ESTABLISHMENT

One example of two-way interactivity is the feedback loop between cultural change and industry dynamics. The industry is changing dramatically, with Microsoft growing up, IBM not just adapting but trying to become adapt*able*, and the operating system losing its importance in a world of development environments and application frameworks such as Taligent's. These same trends are allowing companies (both customers and vendors) to become more diffuse, outsourcing more of their activities even as they attempt to build teamwork in their core functions.

While the mainframe may be going, enterprise computing is coming back: The technology changes, but companies need to think as whole beings even if they use object-oriented, fungible components to do so. They want "openness," but they also want vendors who'll take responsibility for making multi-vendor systems work. That creates problems both for IBM, trying to grease its joints to become a more flexible machine, and WordPerfect, trying to move forward in a market that has moved beyond WordPerfect's strength. The competition now is Lotus Notes and what it represents: the customer (and the vendor) as information system, not as data-processor.

Jim Cannavino, IBM -- Gerstner's vision

"To be world-class is a vision," acknowledges **Jim Cannavino**. "But *how* to be world-class -- that's a strategy." As IBM's new chief strategist, appointed last fall, Cannavino is fielding the vision question for chairman Lou Gerstner and is in his first staff job in 31 years. "We specifically didn't want someone whose formal discipline is strategy," he says. Cannavino has run both mainframe and PC operations for IBM, and knows his way around the company and the industry.

Cannavino's vision is not to turn IBM into a services or systems integration company, as some have suggested, but to make each division within the company a better version of what it already is. There are a lot of inefficiencies out there that he is rooting out -- from a once underused in-house semiconductor plant that now profitably sells more than $8 million of product into the merchant market, to lack of marketing focus (which he personally cleaned up at the PC Company) to lack of coordination among purchasing groups. "If you're going to pay the price of being large, you've got to get

the benefits of it too," he notes. For example, "We should use common parts across divisions. Given the amount we buy, we should purchase components for less than any other organization on earth. I'm not going to finance the rest of the industry." Technically, a lot will be riding on PowerPC, which should become the basic technology of most of IBM's hardware.

In a sense, the biggest disadvantage of IBM's size is not financial, but the market's expectations: Rather than a microcosm or a subset of the industry, IBM is a *macro*cosm of everything that's there. Says Cannavino: "It's hard to write a vision for a whole industry." To satisfy its broad range of customers, IBM has to do more than any other vendor: Customers want a full product line and won't let IBM cherry-pick. IBM is staying in mature markets at the behest of mature customers who still want mainframes, still want full-service support, still want a full line of products. But they don't want to pay for the infrastructure IBM must maintain to support them. Meanwhile, small efforts can't have much impact on a giant company, but giant changes are hard to implement. These are the fundamental challenges Cannavino -- and IBM -- face.

Mike Maples, Microsoft -- Microsoft matures

By contrast, **Microsoft** has shown genius at picking immature markets at just the right point. But the environment and Microsoft are changing, as Microsoft's **Mike Maples** acknowledges. "Pcs were unknown when we started," he says. "No one was watching or expecting it to be a big business. We could experiment in private. Now, the next new market, the home, is well-known. People in other industries are expecting a big market and are scrambling to be part of it. It's not an amateur's game anymore. People with big money are investing heavily and strategically...maybe more than appropriate."

Maples came to Microsoft (from IBM) six years ago, to run Microsoft's application business. The company has grown seven times since then, and the application business has grown nine times. Now Maples is in charge of both systems and application software. Microsoft can't hope to continue its explosive growth in the business software market, given pricing trends and competition. So the consumer market is an important new direction, but the business market remains the foundation.

Thus, although Microsoft is entering new markets, Maples' charter is to make sure it stays focused, and to keep the basic business moving forward even as other parts of the company move out into other areas. It used to be that development, production and marketing were aligned straightforwardly, Maples notes. Now some technologies are shared across product groups; the same base products serve different markets; large multinational customers want special treatment; and the company as a whole gets more than half its revenues from overseas (with many different versions required). This has created a new complexity of interdependencies of schedules and technology that only its enemies could wish on Microsoft.

As Microsoft's resident grown-up, Maples faces the task of guiding the company to maturity. It comprises both millionaires who had stock early, and younger employees who have no chance of seeing that kind of stock performance. "How do we motivate people who have more money than they know what to do with?" asks Maples rhetorically. The company also has to figure out what it's good at and what it should leave to third parties -- whole busi-

nesses such as systems integration and perhaps installation services. The Microsoft business model depends on mass production and dissemination of technology -- that is, market share.

Ad Rietveld, WordPerfect -- perfecting the look

Ad Rietveld has been busy in the last few months presenting himself as **WordPerfect's** new face -- both inside and outside the company. (Unlike WP's previous industry presence, Pete Peterson, Rietveld is ceo.) He knows the company well, since he distributed its products in Europe starting in 1985 through his own company, DELTAware. In 1988, he sold DELTAware to WordPerfect and joined the company to set up its European operations. Earlier, he was a software developer at a Deltacom, and outsourced to Honeywell Bull and ICL, working on office automation systems. All that provides good fodder for a discussion of changing corporate structures -- and for WordPerfect's current strategy.

In 1992 he moved to Utah to become senior vp sales and marketing for the whole company and spearheaded the acquisitions of Reference Software and SoftSolutions. His strategic direction for the company is to move beyond word-processing into a broader field of office automation, with support for document management and communications, as opposed to processing words for a single user. WordPerfect's initial step is WISE, the WordPerfect Information System Environment and a focus on office, not individual, automation; another step is simply changing the company's self-perception.

Rietveld faces WordPerfect's legacy of success, which let the company prosper for a long time without taking much initiative. Now the world is fiercer, and Rietveld has the tough job of bringing the news home. As a relative newcomer, he is free to make changes that everyone acknowledges are necessary. Otherwise, how can a smaller company survive in a world dominated by Microsoft?

Joe Guglielmi, Taligent -- old code in new models

In a world shaped by Microsoft and the incoherent forces of UNIX, no one can hope to launch a new operating system successfully -- unless its parents include the likes of IBM, Apple and now Hewlett-Packard. **Taligent** has those parents; it also has a new model, painstakingly derived, of a world in which the operating system is no longer the basic platform. Rather, it's the development and operating environment that sits on top of a range of operating systems. This is a shift from Taligent's original notion of building an operating system. Starting from scratch without an existing operating system, Taligent has the freedom to redesign the house from the ground up. (It is still using the original Pink code, but broken up into modules.) In its new model, the operating system includes a kernel and a few low-level OS services, is mostly just a tiny kernel, hidden not just from users but also from application developers.

Taligent can be OS-independent. Developers work on Taligent, and get a selection of OSes for free. And since Taligent runs on existing OSes, it avoids the perception problems of incompatibility with everything else.

Thus Taligent is a disruptive force. Much like Lotus Notes in a smaller sphere, Taligent operates across OS platforms -- and will make users and de-

velopers dependent on it instead of on the underlying operating system. Culturally, Taligent comes from the mixed heritage of Apple and IBM (with a strain of the late Metaphor thrown in). It now faces the challenge of establishing its own identity.

One of Taligent's most interesting contributions is its notion of people, places and things. This is somewhat akin to the villages now popping up everywhere, but much richer. Basically, these are the abstractions necessary to build workflow and groupware applications from the ground up. Underneath it all is some of the same old code (C++ and the like), but it's organized so that an end-user or business person can have some hope of defining or modifying applications directly, rather than through a programmer or IS department. (Taligent will also be making a company presentation.)

PANEL: NEW CULTURE

The global net will foster the deconstruction of large companies, most people believe. Employees, laid off or self-motivated, will leave large firms; many of them will turn around and consult for their former employers. Technology may be the enabler, of course, but business results are pushing the trend: Companies can't afford all their employees anymore. IBM, AT&T and WordPerfect have had layoffs, and even Microsoft has had small-scale reductions in some specific areas.

But what of the customers? IBM seems to believe that customers would still prefer to buy from a single entity that will take care of all their needs. But are the customers willing to pay for what this costs? Perhaps part of the answer comes from operations such as **Corporate Software's** support outsourcing service, which allows vendors to outsource support for economies of scale -- and better support, in principle (page 29). Does this mean that brand names become a company's face to the customer, while the company itself is merely the organizer of functions performed by third parties?

In fact, units within companies work best on the basis of teamwork, not pseudo-market or real-market systems. That is, they need Notes or the equivalent to share information, as well as workflow and market-oriented cost centers to increase visible efficiency. Support for collaboration is a key benefit within companies (as we'll discuss in detail on Wednesday) -- one many firms try to achieve through alliances. But how many special alliances can a single company have?

For the companies here as for others, change is disruptive. For IBM it means more internal competition instead of a hierarchical, process-oriented culture. For AT&T it means a lot more competition on the outside -- and the absorption of a multitude of new businesses on the inside. For WordPerfect, it means opening up to the outside world in culture and in product strategy. For Microsoft, it means an aging workforce with outside interests -- all led by a newly married chairman. For newcomer Taligent, it means opportunity -- but lots of competition.

Bob Kavner, AT&T -- open platform for teamwork and integration

Much has changed since **Bob Kavner's** appearance at the PC Forum last year, both inside and outside **AT&T**. Kavner is now in charge of the newly formed Multimedia Products and Services Group, which includes all the interesting

stuff: PBXes and voicemail, consumer products, advanced data communications (AT&T Paradyne), AT&T Ventures. government services and multimedia services (which includes AT&T EasyLink).

Since last year, the US government has launched major legislative changes that may affect the communications industry as much as the Communications Act of 1934 and AT&T's divestiture in 1984. Vendors, carriers and content suppliers have announced, accelerated and delayed mergers, joint ventures and interactive-tv trials everywhere. Most recently, the Bell Atlantic/TCI merger collapsed, and MCI announced both a local-access spinout named MCI Metro and its intent to invest in Nextel, giving it a foothold in wireless to compete with AT&T's McCaw Cellular.

Kavner's efforts amid this chaos are narrowly focused: He wants to help his team deliver open platforms with distributed intelligence that can host AT&T and third-party services. To pull it off, he must lobby government and industry people and act as a coach and coordinator internally.

The recently announced Telescript-based PersonaLink service is AT&T's first foray into this field. According to Kavner, AT&T already has a successful model for open-access hosting: "AT&T's 800-number service represents 40 percent of all calls made last year in the US -- that's 12 billion calls. We gave consumers and content providers easy access to the network; they used it creatively and passionately, with great entrepreneurial spirit. It changed the way humans behaved and interacted. Americans have learned to use the network for more than voice conversation. They learned to use it for transactions; that's why it's a precursor for interactive multimedia."

Kavner wants to bring this market dynamic to PersonaLink and further multimedia ventures. He empathizes with media producers who have had trouble getting on the cable tv system.

To create appealing devices and services, Kavner's units have experimented broadly. AT&T's portfolio of multimedia and services investments has had portfolio-style results: Personal-electronics startups such as GO/EO and 3DO have disappointed early backers; some projects have yielded insights, such as the so-called VinnyVision interactive-tv trial in Chicago (run by AT&T's Vinny Grosso). VoiceSpan, an AT&T technology that enables simultaneous voice and data calls, looks promising. Imagine playing an online game *and* hearing your partner's voice over an ordinary phone line; that's what you can do with a VoiceSpan device AT&T has built for Sega. One major lesson from the experiments is how much consumers value integration.

Kavner must now apply his wry wit and considerable intellect to figure out which constraints bind and which opportunities beckon the most. More than ever, he has to manage personalities and help his organization learn new ways to think and work. Mobility, interactive tv and software-platform services are all new businesses for AT&T; what skills will it need to succeed?

Ed McCracken, Silicon Graphics -- silicon man

Ed McCracken is **Silicon Graphics'** business side; he brought with him the management style and solidity of Hewlett-Packard. While Sun, SGI's arch-competitor, has broadened out into the general-purpose market with partial

success, SGI has stuck to a defensible concentration on high-end graphics and technical wizardry.

Now SGI is launching an offensive with the same techy positioning into the consumer market/information highway. "We're skipping the pc generation," says ceo McCracken. "The pc by now is old and creaky; the paradigm is washed out." Among other things, SGI is working with Time Warner on its Orlando showcase project, supplying most of the underlying technology. (In contrast to the pc, this new technology is leading-edge and still untested, leading to a predictable half-year roll-out delay revealed early in March.)

Why the consumer/communications market? Well, says McCracken, "upgrading the world's communication infrastructure is the most important trend of the next 30 years; it's driving the technology. It's taking over the role the military played in the last 30 years. Our four or five most exciting projects five years ago were military or NASA; now the four or five most exciting are for entertainment. They're not exciting because they're entertaining -- despite all the excitement over SGI's role in the Jurassic Park movie -- but because they're stretching us technically. Orlando is the most challenging thing we're doing." To build a system with a remote control device that lets the user thinks it's a smart tv set when actually he's communicating with a server across town, requires fast delivery and careful buffering so as not to overload the consumer system's limited memory.

Silicon Graphics' contribution includes the design of the remote control, the set-top box (including its OS, a subset of UNIX), and the video server -- everything except for the ATM communications system. The user interface, also designed by SGI, is a 3D village through which the user can fly, visiting a newsstand, a movie theatre, a video arcade -- and of course a shopping mall. There's also a cafe or auditorium for public and casual meetings.

The set-top box contains a MIPS RISC chip, which handles graphics, display and some local processing such as interpreting the user's commands. It's all built with SGI graphics libraries and other APIs, which SGI will make available to outsiders for a fee. As for cost, McCracken is planning how to offer a realistic price by 1997 -- which he considers to be about $300 for each set-top box and $300 per user attributable to server and central costs. "We're about ten times that now, which is where we should be," he notes.

Aside from Time Warner and Nintendo (to whom it has committed technology that will allow Nintendo to deliver a $295 64-bit video machine to consumers), SGI is also working with a couple of phone companies McCracken doesn't yet want to name. In short, this is a company that knows what to do with dinosaurs.

PANEL: THE NII -- RIGHTS, PRIVILEGES AND RESPONSIBILITIES

Nowadays, the national information infrastructure usually takes capital letters. It is the subject of heated debate everywhere -- starting with the question of what it is. We don't think it can be defined any more than the environment can be defined -- it's everything we use to share electronic information, plus the information itself. Legally, too, it should work much like the environment: Normal legal and constitutional protections should apply. And like the environment, it should have public and private places: places where everything that's legal is allowed, and other community-run

places with narrower rules and policies. Membership in some of these communities can be free, while others may be organized for profit by a commercial sponsor. While access to content may be restricted to those willing to pay for it, access to the ability to disseminate content should be available to all on a nondiscriminatory basis.

It's hard anymore to find anyone who thinks the government should *build* the national information infrastructure, but there's still a lot of discussion about how to ensure universal access -- and what it means. Should channel owners be required to donate a portion of capacity to "worthy groups" -- schools, the poor, or whatever they are defined to be? Should rates be regulated? And more interestingly, what about open access to content: How do the less privileged get their voices heard (other than at 5 am on Sunday)? The goal, we believe, should not be *free* access but nondiscriminatory access: Juan should pay the same rates as Alice for the same service, and Time Warner should allow Disney to sell its wares over the T-W system.

Censorship can be imposed only by monopolies and governments (which amount to the same thing).

That's *legal* "openness." There's also technical openness -- common protocols and technical standards. Another factor is "meta-openness," as coined by Mitch Kapor -- common standards for directories and the like. In other words, it should be possible not only to reach everyone on the net, but it should be possible to find anything anyone wants to make available. That requires some kind of standards for listings in directories.

There might also be standard formats for ratings. If parents want to control the content their kids see, or rely on a service to filter their own viewing, fine. But there should be competitive ratings services, all using the same format but with their own content. You could use the ACLU's ratings, American Way's or those of your own rabbi or parish priest.

Then there's the whole issue of privacy, and technical and legal protection for it. We have only two panelists -- McCracken and Kavner -- for this session because we expect a lot of discussion with the audience!

DINNER: BRUCE STERLING -- FOOD FOR LAUGHTER

Science-fiction writer **Bruce Sterling** speaks for himself far more eloquently than we could ever hope to. He lives in Austin and roams the electronic frontier, especially the science fiction division. He edited the story collection *Mirrorshades*, "the definitive document of the cyberpunk movement," but he's too cool an observer to be part of any particular movement himself. His books include *Islands in the Net* (1988), *The Difference Engine (with William Gibson* (1990) and *The Hacker Crackdown: Law and Disorder on the Electronic Frontier* (1992), which will be distributed at the Forum.

TUESDAY: LIFE ON THE NET

Life on the net is both social and commercial. But both sides want privacy and security...

John Gage, Sun -- engagé and engaging

John Gage, officially director of **Sun Microsystems'** science office, is the company's resident maniac. He reports to chief technical officer Eric Schmidt (along with Bill Joy, Bert and Ivan Sutherland and Bob Sproull) and acts as the company's ambassador to the technical community wherever it exists -- in universities, businesses, Washington, DC, and even governments abroad. Always ready to go to Washington to talk the government out of its latest unconsidered misstep, he has driven the company's involvement in political activities and the intelligence community. The scholar's workstation and the analyst's workstation are essentially the same thing, he says. "The idea is to make things visible that were invisible, in science and intelligence."

Currently, he is focusing on the technical issues of the Internet -- including its vulnerability to security breaches. In a bravura performance before Ed Markey's subcommittee on telecommunications and finance last year, he grabbed the Senate's attention with three demos: He built an ATM network in the Rayburn committee room and linked it directly to Moscow via the Russian missile and space command satellite. Next, he turned a cellular phone into a scanner and listened to the conversations of Congressmen, drug dealers and hookers (at least two separate communities, to be sure). Finally, he captured keystroke by keystroke the activities of Amsterdam hackers as they wandered through the Pacific fleet command computers. "The cell phone thing really got them 'cause they use them every day," he notes deadpan, "but the hackers are far more serious..."

PANEL: COMMUNITIES ON THE NET

In **Release 1.0**, 6-93, we distinguished between communities (groups of people) and communion (the intangible and fragile feeling of connectedness). Both are useful concepts for online services, especially in these times of high subscriber churn and shifting consumer brand loyalties (fewer and fewer people ask for Camay soap or Bayer aspirin, but kids shoot each other over Air Jordan sneakers).

Bottom-line, community and communion are valuable to online service providers because they represent higher margins and steadier revenue streams. The visceral tug people feel when connecting with each other online may lead to greater loyalty. Beyond subscriber retention, that tug enhances advertising channels, because people follow recommendations from others whom they trust and to whom they feel connected.

That visceral tug may also help with governance: When people feel tied in and responsible, they mind their actions more, and punishments have more substance. Evicting someone who isn't emotionally attached to the service and wants to get you mad is no punishment.

Communion's evanescence makes it hard to invoke, maintain or control. That means communion is less a factor of pricing, marketing and technology

(though those matter) and more about the way things are done online. It's about how ordinary people learn how to be together and form communities of practice around the mundane but important topics of real life.

To foster communities, online services do what they can: They help special-interest groups form, they select and reward hosts carefully, they attract publications and associations and they attempt to give their services (or selected areas within their services) an attitude or ambience. They also create and enforce rules, make subtle interface-design and content decisions and participate online.

The online world is not as simple or as safe as some imagine an artificial world to be. Social issues have surfaced online, not all of them pleasant. Most online services have troublemakers, some of whom precipitate major re-thinking about a community's purpose or processes. Are online services inevitably anarchic, or can management retain control? How? How do services and hosts deal with miscreants and the small percentage of subscribers who consume the most resources?

Dangerous curves

Often rules aren't clear or can only be learned from others over time. Do we need common nomenclature and signage in the online world? What's the cyberspace equivalent of a Yield sign? In 1999, will consortia be discussing such symbols the way they wrestle over APIs and protocol stacks today? Does too much explicitness spoil things?

Small, local communities play an important role in the online world. For one thing, they can meet in person more easily, which helps build and develop relationships. Can a large online service feel cozy? Can small services scale up? Note that an Internet connection can instantly make the smallest service feel as large as Prodigy or CompuServe. Do better-looking Internet front-ends threaten conferencing systems?

The panel includes representatives from five online services: America Online, CompuServe, Echo, Prodigy and Women's Wire. We wrote about most of these services in the issues on community (Release 1.0, 6-93 and 7-93). These and other services will be available for exploration on Monday and Tuesday afternoon in the Rumpus Room (see page 35).

Steve Case, America Online -- coping with volume

America Online has been in the news plenty over the past year, both because its stock has skyrocketed (from around $25 to over $80) and because its rapid subscriber growth has caused noticeable access and performance problems. Unlike other large online services, which have parent corporations in other lines of business, AOL is a pure play. Its model is simple: no advertising, no transaction services and no hidden charges for users.

The service makes money when people stay online beyond their breakeven point, which makes subscriber churn a particularly sensitive issue. AOL has worked hard to accommodate the Internet, as well as to strike visible media deals: Time Magazine, the San Jose Mercury News and the Chicago Tribune are all on America Online, along with many other publications and associations.

AOL's software isn't too powerful, but its simplicity (there's not much more than icons, scrolling lists and dialog boxes, though improvements are on the way) and occasional elegance get it pretty far. Some examples: chat rooms are easy to find, navigate and use; it's easy to address Internet messages and download or attach files; the mail system lops off inbound Internet message headers and places them at the end of the message text for readability.

But AOL's marketing has jumped ahead of its operations, and the competitive environment is heating up. Several new services have announced their imminent presence, some of which may be hard to distinguish from AOL -- most notably Apple's e·World. And AOL's Macintosh software doesn't yet support 9600-baud access, which is now the typical speed for other services.

Steve Case, America Online's president and founder, is faced with a service so large that any experimentation could cause calamitous shifts in processor load, yet he needs to experiment in order to roll out new features. Competitive services are no longer standing by idly. They are attacking aggressively, getting even for tactics AOL used before (e.g., the Prodigy refugees forum) and launching a few scuds of their own.

Maury Cox, CompuServe -- managing size and profits

CompuServe and Prodigy are the two largest commercial online services in the US, with between one and two million members each, depending on whether you count active individuals, households or merely people with accounts. (How do you count someone who hasn't logged on in a year but still pays the monthly credit-card charge?) Whatever the measure, these large services have a different flavor from the smaller ones.

Unlike its major competitors, CompuServe hasn't had any visible PR or infrastructural calamities. Its system runs quickly and reliably because of the company's constant attention to performance and private, worldwide data network. Its serious commercial approach has made CompuServe one of the few clearly profitable online services, with membership up 40 percent in the past year and revenues up 50 percent.

Maury Cox has been with CompuServe since 1979, when he left CDC's Service Bureau Company to become CompuServe's manager of large-account marketing. He worked his way up the ranks and became president and ceo in 1990. Now he must decide how to define CompuServe amid the growing interest in the Internet and the barrage of new service announcements.

Chat and bulletin-board services on CompuServe are very active, and account for over half of the service's overall usage revenues. Its forums are the dominant place for computer vendors to offer support and software libraries online -- worldwide. People also upload plenty of software, clip art and other stuff for others to download.

Historically, CompuServe has done more to improve its system's performance than the user experience, but that should change: CompuServe recently announced that it will port its Host-Micro Interface toolbox to **General Magic**'s Magic Cap software. This will allow third parties to write new, graphical front-ends to CompuServe, which may help enable new service features by modifying its services. (CompuServe is not licensing Telescript.)

CompuServe should continue to grow profitably, though it will find increasing competition in its specialty areas. For instance, CompuServe has had the widest variety of information providers such as Sabre and Disclosure, but now publishers are making deals with competitors (see, for example, **Ziff-Davis Interactive**'s new Interchange service, page 16). Also, inexpensive resources on the Internet are strong competition for paid online database services, despite the high chaff-to-wheat ratio. Note, however, that the Internet will only get more expensive.

Stacy Horn, Echo -- hangin' out in New York

Several experiences motivated **Stacy Horn** to start **Echo** in 1990. One was trying to set up a bulletin-board service for internal use at Mobil Oil, where she spent four years as a telecommunications analyst. Another was using **The WELL** for a project in the Interactive Communications program at New York University, where she was studying for a masters degree. Now the head of a profitable and thriving, 1500-member online community that is getting remarkable press coverage, Horn can survey her domain from the entry hall of her fifth-floor Manhattan walk-up apartment: The entire service runs in the back of her living room on two 486 machines and a bank of modems that make every day look like Christmas.

Echo is both intimate and technical, local and global. Its subscribers don't use "chat" functions much; most of the action is in the conferences, where people compose their postings more thoughtfully. Horn has gone to special pains to make the place hospitable to women, who represent a higher proportion of Echo's subscribers (40 percent) than is usual for a village in cyberspace. Many Echoistes meet every other Monday at the Art Bar in Greenwich Village.

Horn's personal involvement was essential in setting the service's tone. Although she has less and less time to spend online, Horn's personality suffuses the system. For example, one subscriber teases a conference host who disciplines a topic drifter in a good-natured way by saying that the host must have gone to *Stacy School*. Now Horn is charting a course for the next few years. Short-term, she wants to improve its interface and attract more publications and organizations with attitudes (especially the social, cultural or literary variety) such as the Village Voice, Ms. Magazine and the Whitney Museum of Art. Longer-term, she wants to preserve Echo's intimacy and regional flavor, but she is interested in finding ways to link up with other services across the country -- or sprout some more of her own.

Echo offers Internet access, including Gopher and SLIP services. A World Wide Web server is in the works, and some subscribers are developing a MOO called the Subway. Basic monthly rates are around $20 (for 30 hours, with discounts for seniors and students), with surcharges for Internet and SLIP access. Horn started Echo with $10,000 of her own money; it is funded from operating income.

Scott Kurnit, Prodigy -- a sea change to see change

Scott Kurnit knows tv. He came to **Prodigy** in 1993 after 14 years with Viacom and Warner Communications, where he kick-started the pay-per-view industry and ran early experiments with interactive services at the Warner QUBE system in Columbus, Ohio. Now he wants to mid-life-kick Prodigy, where he

is responsible for all content, look and feel, marketing, customer service and development projects such as cable tv.

After much agony, Prodigy seems to have turned an important corner. Ross Glatzer stepped in as Prodigy's ceo in 1992, and has pushed new technology alliances faster than many competing services. Prodigy was the first service to team up with a cable company (Cox Enterprises, no relation to Maury). Prodigy has limited message censorship (which got it in hot water early on) and is experimenting with new user-interface designs. Prodigy is also exploring its fit as a business platform: Coldwell Banker, Sears' real-estate arm, runs its own version of the Prodigy software as a private network for its business-to-business traffic.

Kurnit knows things have to change even more. He says, "It'd be a great service if we didn't have to deliver it through computers and modems." Kurnit wants to take the service toward tv: Witness Prodigy's new real-time tv commercials, which point to online "conversations" that tie to the tv show in progress (all without a chat function!) and the prototype of Prodigy TV, which you can try out in our demo area. Before Kurnit's arrival, Prodigy had been taking shots on the chin regularly from the press and competitors. Now he's dishing out as good as it gets.

The media bug bit Kurnit early; his father was in the advertising business. At 14 he created his first film. At 26 (after being in the same Hampshire College class as our own Daphne Kis), Kurnit became public tv's youngest program director. He defends QUBE, the ill-fated interactive-cable experiment in Columbus, and says it was actually a wild success that was cut short when Atari nose-dived and Warner stopped funding such projects. QUBE, says Kurnit, helped spawn MTV, Nickelodeon and the Movie Channel. In 1985, Kurnit founded Viewer's Choice, the first pay-per-view system; then he founded Viacom's Showtime Event Television in 1988, which he ran until he joined Prodigy last June.[1]

Kurnit also got online early, including Prodigy. But he was unhappy with its performance on a Mac Plus at 2400 baud and canceled his account. Now he's inside Prodigy, working for the bluest-chip giants, IBM and Sears. He's aware of the establishment thinking that caused so many problems in Prodigy's early years and says, "My wife and I have a deal: If she sees me catching the virus, she won't let me out the door."

Ellen Pack, Women's Wire -- community and gender issues

South San Francisco-based **Women's Wire**, a new online service, focuses on women's issues, but it's not for women only: So far, about 10 percent of its 700 subscribers are men. More interesting, though, is its supportive and unusually trouble-free atmosphere, which could be a function of the service's recent launch or some unspoken fear among participants of offending others, but is more likely due to a shared feeling of safety.

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1 *To simplify transactions for Showtime, he worked with AT&T to develop the first commercial use of ANI (automatic number identification, which is part of all 800- and 900-number calls).*

Whatever its cause, **Ellen Pack**, Women's Wire's president and co-founder, is happy that the service she and Nancy Rhine launched in 1993 has attracted a strong community of participants. Pack's interest in the online world started when she moved from New York City to Palo Alto in 1991 as coo of Torque Systems, a vendor of high-end multiprocessing software. She began using e-mail and joined The WELL and other online services, where she was fascinated by the people she encountered and the interactions they had.

But she was frustrated that those places were mostly dominated by males[2] with a few private areas for women, and that her women friends back in New York weren't online and weren't likely to learn the vagaries of terminal programs and conferencing-system commands to get online. When she broached the idea of a women's service in the WOW conference (Women on the WELL, a private conference), she got immediate, broad support. She also met Nancy Rhine, an online consultant and former WELL manager who joined Pack to start the new service. Pack's family provided startup financing.

Pack and Rhine launched Women's Wire last October. (The service costs $15 per month with 2 free hours, plus $2.50 per hour. It runs on a Unix box and several Macintosh Quadras at Pandora Systems in San Francisco.) Pack considers the service's small size an advantage. It can offer very personal, high-quality support, especially for first-timers, some of whom need to be guided through their selection of PCs and modems. She and Rhine have oriented the service for women: They have chosen conference hosts carefully and given them support, brought non-profit women's organizations online, and invited well-known women to participate in online real-time discussions.

COMMERCIAL BREAK: FOUR ANNOUNCEMENTS[3]

The obverse of interoperability is that users will be able to log on to any particular content service from any particular connection service; that is, all carriers will "carry" all content providers. That will change the balance of power for brand-name services such as CompuServe, Prodigy and America Online, who now offer a tightly coupled package of content and carriage. In the really bad, really old days, you could trade e-mail only with people on your own particular service provider; in the really good, really new days, you may be able to log onto a particular AOL forum, for example, forum without paying for the rest of AOL's service. (What does that mean for AOL, or CompuServe, or Prodigy?) These broad services, incidentally, offer only limited facilities for content preparation and presentation, forcing everything into a virtual ASCII jail (thanks for the phrase, John Warnock!).

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2 *Women are often excited to find the Usenet, then get disappointed with the way women's issues are handled there. For example, the news group alt.soc.feminism often consists of men's tirades against feminism, with little constructive content. One solution is to create private women's spaces online, which are quite helpful, but their exclusionary nature inhibits discussions between men and women.*

3 *Although they look like sponsors, people from these four companies paid the same fees as anyone else. We selected them to show off their work in the general session because it is especially germane to the day's theme. (But thanks for bringing twelve people, Mike!)*

Accordingly, we are pausing for brief commercials for three new online services, each with its own business model. These services are delivered to customers who dial in directly, but all three are also software environments available to third parties. The third parties can either deliver their information over the vendor's system (from the vendor's server) or build their own services (for a fee, of course). We also present the debut of **Collabra**, with a software package for internal information-sharing.

They address separate needs: **Ziff-Davis Interactive's** Interchange provides information and information management, with the user picking and choosing what is of interest; **Connect** provides a buying environment and transaction management, which IDG will use as the basis of its new electronic marketplace service; **nett Information Products** provides product support, sponsored by vendors. nett is perhaps the most focused; it preserves the integrity of the vendor's "trade dress" by using Adobe Acrobat to present and display page-oriented material. By contrast, the Connect service has its own look and data formats. Interchange is somewhat in-between; it's a rich Windows environment with its own interface, but one that allows substantial customization and creation of content-specific views. It controls the screen real estate and resizes text to fit its on-screen format.

With Ziff Interchange, the user pays for the information (with royalties to the information provider), although advertiser support will increase, ZD Interactive president **Michael Kolowich** hopes. With nett, both user and vendor pay from the start. The Connect service starts as a subscription service paid for by viewers, but eventually the vendors whose goods are being promoted will pay, sending transaction-based fees to the service provider.

All three provide some form of feedback -- or two-way interactivity. Nett has all the facilities of Notes or other distributed databases, and vendors can collect as much feedback as the users provide. Ziff Interchange likewise allows for feedback to content providers, but more interestingly it promotes communication among subscribers. The Connect feedback is mostly of a financial kind -- purchases -- although users can also send mail back to content providers or participate in vendor-sponsored forums.

Mike Kolowich, Ziff-Davis Interactive -- start with editorial

Ziff Interchange was developed almost entirely in-house, by a team led by Ed Belove and Mike Kraley, both formerly with Lotus. Belove managed development of Agenda, Magellan and Improv; Kraley's credits include MCI Mail (built at BBN for MCI), the MasterCard transaction network and parts of the Internet. The discerning eye can see some of all of these in Interchange: It has strong communications underpinnings. And unlike most other services, which simply let you prepare text and multimedia, it has strong support for static and dynamic linking, personalized "views" of the content and the like. It also includes facilities for identifying and pricing each content object separately, and Ziff is working on a back-end accounting system. (Maybe it should stop work and check with **Pehong Chen**, page 20.)

Further, and intriguing, is the notion of charging for the views and links as well as the content -- i.e., for a particular information filter. (Note for example that the information in the phone book is not copyrightable, but specific organizations and structures of it can be copyrighted.) That is, you could put a surcharge on a particular editor's way of selecting and organizing the information. (We like this!)

At the Forum, Ziff will be concentrating on its editorial (developer) environment rather than its service, inviting third parties to consider using it for their own content, either as part of Ziff's own service or to construct and manage services of their own. Ziff has also brought along a significant new content partner, **The Washington Post** (to keep it honest during the demos!). The Post's **Ralph Terkowitz** will be demoing the software and will describe some of its experiences working with the Interchange development environment during the Ziff afternoon presentations. The Post will offer its own service, as well as provide a subset of its content for Ziff Interchange members. (The Post and Ziff-Davis met at the 1992 **PC Forum** and got serious at last year's.)

Tom Kehler, Connect -- start with sales material

Connect is also bringing along a partner, **IDG Electronic Marketplace**. Or to be blunt, a customer: Both a tool vendor and an outsourcer, Connect sells its software tools and communications expertise, and also works with customers such as IDG to help them build private networks and information/transaction services. It can also manage the service for an information provider, acting as an outsourcer on its own Pyramid and Stratus servers at its Cupertino headquarters. Customers include BBDO, KnowledgeWare, Pyramid, Domino's Pizza, Software AG and Hi-Care of Hungary.

The original Connect software was more an online information service; the new version IDG will use adds substantial transaction-management support. It is built on top of Oracle; the new IDG service is in fact an Oracle application linked to an extensive information database also stored in Oracle's database, which includes editorial material (from various IDG publications), vendors' own material and items posted by other users. The buying transactions are Oracle applications. The system runs on any UNIX/Oracle environment, although the original version was on IBM mainframes. As with Ziff's Interchange, much of the effort will go to information preparation. Most difficult, we expect, will be providing fair comparisons among apples-and-oranges products. Most product information doesn't fit neatly into a relational database.

The particular service offered by IDG Electronic Marketplace is not just an information service but a buying service, with specific facilities for comparing different brands or models of equivalent products. There will be a roster of services focused on product areas such as mobile computing, LAN products and personal productivity software. In addition to fill-in-the-blanks purchase orders, customers will be able to send out one-to-many RFQs to vendors that fit specified criteria. Or they will be able to negotiate or send in comments or complaints in free-form. Customers communicate with each other by e-mail or posting messages to a variety of forums.

The business model works as follows: IDG pays for the software, and pays time-based fees to Connect for operating the service. In turn, it charges the vendors placement fees plus a fee per purchase-oriented communication/transaction, and the customers pay a subscription fee (which may be paid by a sponsoring vendor). There are no ads per se, but buyers and sellers can find each other in showrooms and other settings.

Fadi Chehade, nett Information Products -- start with documentation

Nett Information Products' infoWare is built on top of Lotus Notes, with versions on other distributed databases in the works. The company's achievement is not so much its software as its two years of work getting vendors such as Novell, Xircom, Retix and American Power Conversion to supply product, sales and support information. Nett's customers are dealers and distributors, especially those in Europe who have a tough time just calling up the vendor when they face a bug or a problem, or they need background for a sales presentation. Nett's biggest challenge now is finding a strong communications partner to handle the plumbing side painlessly -- a challenge the company thinks it will shortly solve.

Nett gets both publishing fees from the vendors and annual subscription fees from the resellers (according to the particular vendors' information they want to receive). Charges are $100,000, $50,000 or $25,000 per year, depending on volume of data. Vendors can sponsor subscriptions for their key resellers -- or for large-volume users, for that matter. For users, the charges start at $300 a year for a single vendor's information, but unit charges drop rapidly as the number of users or vendors increases.

The information is delivered either as faithful reproductions of the vendors' literature, displayed and rendered somewhat unchangeable in Adobe's Acrobat. The combination of Notes, Acrobat and Verity's text engine provides easily searchable and structured information, with the ability to filter and alert readers about specific information. The service also includes actual code patches when appropriate.

nett, which is based both in Los Angeles and Stockholm, is especially sensitive to the difficulties out-of-country people face getting good product support and timely marketing information. Ceo **Fadi Chehade** previously founded and ran several networking products distribution companies in Europe and the Pacific Rim.

Eric Hahn, Collabra -- start with conversations

You can get a lot of communicating done with plain old e-mail, but discussions with many people can be hard to control and organize, especially if they involve sharing work documents. People who have subscribed to too many Internet mailing lists know the feeling. It's difficult to visualize the topics and issues. Finding old messages can be impossible, unless you're really disciplined about saving and storing stuff. To add structure, you can install information-sharing systems such as Lotus Notes, but they require substantial investment and administration, and they don't support users who aren't using the software.

Collabra Software's Share software, which debuts at this Forum, falls between the two extremes (and in fact can coexist with both): It piggybacks on existing e-mail systems and enhances them with a more visual interface as well as message threads, discussion groups, text-search features and management tools. Share helps people on diverse platforms organize, share and retrieve messages and documents; its message forums look like a cross between the topic-and-message hierarchies in Lotus Notes and some of the new browsers. It lets users set up simple filters and run queries directly or through e-mail. It also manages message replication and helps simplify

forum administration through forum policy statements, which help limit forum and message size, add privacy and manage message and document storage.

People who aren't running Share can still participate in forums by e-mail, which makes the system an appealing tool for informal groups and discussions. Share examines the messages and uses heuristics to sort them. That means Share offers corporations many of the functions of Internet list servers, plus text search and remote queries by mail. Share users can also exchange messages with Notes through a gateway from Collabra.

Eric Hahn founded Collabra just a year ago after leaving Lotus' cc:Mail division, where he led work on message-interchange standards (the Vendor-Independent Messaging and Common Messaging Call standards). He was cc:Mail's vp of engineering when Lotus bought it (and general manager after the acquisition). Before that, he was the vp and general manager of Convergent's server division and helped re-architect the Arpanet into its current form as the Internet at Bolt, Beranek & Newman.

Share, Collabra's first product, costs between $45 and $75 per user. It supports the major e-mail systems that work with Microsoft Windows 3.1; a Macintosh version is under development. Collabra's first-round funding consists of $2.75 million from a who's-who of venture companies: Merrill, Pickard, Anderson & Eyre; Kleiner, Perkins Caufield & Byers; Mohr, Davidow; and Stanford University.

PANEL INTRO: LORI FENA, TECH BOARD -- INTELLECTUAL PROPERTY FOR SALE

Lori Fena and Amy Bates co-founded **Technology Board of Trade** last year (see **Release 1.0**, 12-93). Its goal is to be an exchange for technology, in forms ranging from software objects to patents, licenses and other intellectual property. The two are well-equipped for this business, which depends more on definition of the property and rights to it than on technical expertise: Fena ran the third-party software-licensing business for Convergent Technologies (by the end, that was pretty much its only business) and Bates was the company's licensing counsel. That gave them a lot of experience in the business of defining, protecting and selling intellectual property. Previously, Fena worked on interactive video at a Pasadena engineering firm.

Thus, says Fena, while the net needs conventions and protocols for billing, credit checking and fraud prevention, detection and redress, it also needs something more fundamental -- a general (but not homogeneous) system for the definition and management of intellectual property rights. This is much more than simply a set of laws; it's a body of typical contracts governing use and re-use, derivative works, etc. It's impossible to build such a system overnight or by fiat; it will grow up through trial and error. In part, Tech Board wants to be a lab for this experimentation; in part, it wants to guide it a little.

There's so much fuzzy thinking surrounding these issues that Fena has decided to address them in a new context: Imagine that food could be replicated almost cost-free. How would the world work then? How could cooks, menu planners and geneticists get paid for their work? Could a seafood house charge for the lobster bibs? If they couldn't, how could we get something more interesting to eat than fish sticks and potato chips every day?

PANEL: THE MARKET IS THE CONTENT -- COMMERCIAL LIFE

The global net of nets is both a transparent communications service and a platform for content-filled or content-enhanced services. A fundamental question for software and hardware companies is how they can position or re-create their products and services for the new online world. A fundamental question for start-ups (and venture capitalists) is what kinds of *new* businesses will be possible on the net. The first step, of course, is to move existing businesses on-line: sell software and information over the net, use it as a shopping service or an advertising medium. But more interesting is the notion of net-*based* businesses -- ones that couldn't exist any other way. One way or another, most of these businesses involve a combination of an information product and the audience itself: Without the audience/participants, the service would not be complete, since it also includes interaction among the members. To the novice eye these may all look the same: What distinguishes The WELL, say, from Echo or from Women's Wire? It's not just the content; it's not just the audience; it's the combination.

This involves a redefinition of information value-added: It's not just more information; it's also *format*. Just as television has talk shows and sitcoms and shopping and news and ads, just as newspapers have news and news analyses and columns and letters to the editor and horoscopes, so will these new services evolve specific formats that give structure to enhance the texture of each service. These give each service an identity and something to promote; they also provide familiar landmarks to members of the service.

Then there are transaction-oriented services. As we've noted (see **Release 1.0**, 10-93), transactions tend to counteract the feeling of membership and long-term commitment; on the other hand, they are lucrative and business is business. Transaction-oriented services could include airline reservations -- but with value-added such as schematics of each aircraft that let you see what kind of seat you're selecting. Or you can have home banking that gives you integrated financial services. More interesting, perhaps, you could have home consumer-data management: Take those services that offer to track your frequent-flier miles, and extend them into a service that manages your transaction data and your buying relationships more broadly. If you give consumers the right to own their transaction data (or affirm the existence of that right), data banks will spring into being to help them manage that information (see **Release 1.0**, 6-91).

Pehong Chen, BroadVision -- a vision of plumbing and metering

Pehong Chen founded Cayenne Systems in 1989; it changed its name to Gain Technology in 1991 and sold itself to Sybase in 1992. With blessings from Sybase, Chen left last summer to found **BroadVision**. BroadVision's vision is a pragmatic one: All these information toll roads will need management and billing systems. More than just accounting or transaction management, BroadVision's product will handle the logistics of complex services, where a single service provider handles business for a variety of information or product providers. For example, a customer might want to look at several catalogues and order a few items from each, comparing the sweater prices of, say, L.L. Bean, Lands End and Nordstrom; or he might order a computer with components from Dell, Media Vision and Microsoft; or he might want to see a film and charge it to BMW in return for watching the BMW-product-placed version. The software is not a fully defined application but more of an appli-

cation framework; it could work as the billing portion for Ziff's Interchange, for example, or in conjunction with Trilogy's NetBuilder configuration tool (see **Release 1.0**, 9-93). Unlike Gain Technology, BroadVision isn't sexy multimedia, but it's the logistical underpinnings that will make many multimedia network services into a business reality. The product will run on any standard SQL database, including Sybase or Oracle.

Scott Cook, Intuit -- pain-free banking

Scott Cook founded **Intuit** in 1983. He had the revolutionary idea of talking to consumers (something he learned from his work at Procter & Gamble on the Crisco business). He discovered something surprising: All the home-finance packages of the time were trying to enrich the consumer's home-finance "experience" -- investment strategy, budgeting, cost allocation and the like. Cook discovered that people didn't want to enrich their time at the kitchen table with the checkbook; they wanted to shorten -- or quicken -- it. Hence Quicken, which has sold more than 6 million copies.

Now he is applying the same philosophy to online services in a deal with Visa to offer online banking to bank customers who use Quicken or Intuit's SOHO accounting package, QuickBooks.[4] Banking at home is something everyone wants in principle, but no one as yet has managed to supply a service large numbers of people will use. The trick is not just ease of use, narrowly defined, but the emotional ease of adopting the whole proposition: "Can I trust this vendor to mediate between me and my bank? Will I be able to use the technology? Whom do I call with questions?" The combination of Intuit and Visa is reassuring.

From the banks' side, there's no standard -- and they don't want to go through something like the incompatible-ATM scenario again. From Intuit's perspective, the Visa connection provides a helpful conduit to the banking community, which is notoriously slow-moving. Although Intuit's market in one sense is the consumers, its second market is all the banks they do business with. "What Visa brings is a potential link to almost every bank in the country, even if it's not right away," says Cook. "They do our negotiating for us. Otherwise, each bank tries to send you data in its own format, but the banks trust Visa to set a standard that will work for everyone."

The lesson for other services: If your potential market is diverse, find an impartial third party to bolster your position. (As Cook says, "There's nothing more fragmented except perhaps the dry-cleaning market.") The Visa-Intuit financial service requires an individual bank to offer it to its own customers, just like Visa credit cards.

Technically (although this won't be apparent to consumers), users will use Intuit software -- Quicken or QuickBooks -- to dial a local or toll-free number which will connect them to an Intuit data center. That in turn will connect to Visa, which will service the participating banks. Intuit will charge the banks a service fee; they in turn will charge customers whatever

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4 *This, of course, is only the latest in a series of recurring-revenue businesses Intuit has pioneered, including checking supplies, payroll tax tables for its QuickPay software, downloadable stock prices and the like.*

they think appropriate, and will market the service like any other banking service. The difference is that the banks won't have to fuss with the technical details; they just get the service from Visa -- although they do have to send and receive data in the proper formats. In essence, they're outsourcing home banking just as they outsource credit card processing. On the other hand, they retain control of marketing, pricing and customer contact.

Cook hesitates to promise too much too soon, but he dismisses seemingly competitive announcements that work with just a couple of banks. "The issue," he says, "is how many zeros you have after the number. I don't expect consumers to react in a big way until they can get it from their own bank. Or better yet, when the bank across the street has it, and their bank doesn't."

Bruce Katz, The WELL -- can you clone a community?

Bruce Katz co-founded the Rockport Shoe Company with his father in 1972. Since selling his interest in 1986 to Reebok International, he has been involved as an investor or director in a variety of ventures ranging from Esprit (the clothing people) to salmon farming in the Pacific Northwest. In 1992 he co-founded the Republic of Tea, a branded tea business based on the contemplative life style: sip by sip, not gulp by gulp.

Most recently, he put aside these other interests to dedicate full time to **The WELL**, which he bought from the Point Foundation earlier this year. The Point Foundation started The WELL in 1985; it also publishes the Whole Earth Review. Although Katz is distinctly non-corporate and laid-back enough to spend several months a year on his boat, he looks at The WELL as an investment, not a social gesture. He wants to see how telecommunication tools can enable the rebuilding of community in America -- in a profit-making, self-sustaining way. His strategy is not so much to grow The WELL itself, as to clone it in other geographical locations around the country.

Interesting questions: How much did The WELL depend on the spirit of its founder, Stewart Brand, who is now departed (to the Global Business Network)? How much on its local community? Whom will Katz find to act as founding parent in each locale, or is the format sufficient to attract the right community? Will it be like settlers forming new colonies?

Although he wasn't really in the industry yet, Katz attended four of the last five Forums. Welcome back, Bruce!

Marc Porat, General Magic -- magical man

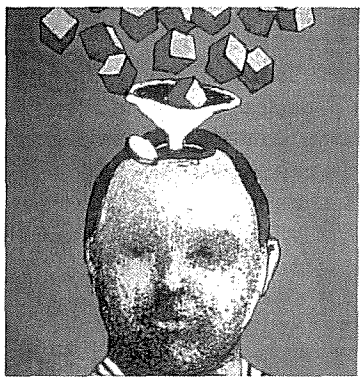
General Magic's development team includes communications wizards Jim White and software wizards Bill Atkinson and Andy Hertzfeld, led by Charles Irby (formerly with Metaphor). They have spent lots of time dealing with robustness and integrity as well as functionality and design. Founded in 1990 by **Marc Porat** as an informal spin-off from Apple, Magic is now one of the old guard of the network business. It announced its product more than a year ago, and has shipped development kits to some 30 software developers as well as to its line-up of partner/sponsors, which includes Apple, AT&T, Fujitsu, Sony, Motorola, Philips, Matsushita and NTT, lined up by master salesman/ceo Marc Porat. The mere presence of so many partners promises the emergence of a standard around General Magic's Telescript, a language/development environment for communications-oriented applications. The language focuses on the delivery and management of smart messages -- and all

that this entails. The Telescript scripts can execute remotely, as long as the recipient or server has a Telescript engine (i.e., interpreter).

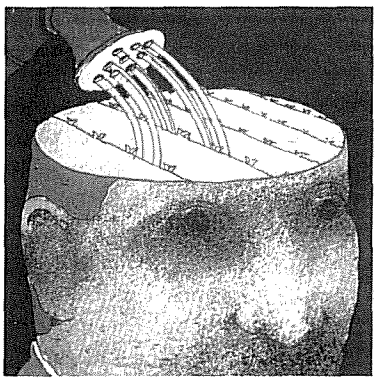
Telescript agents can be launched, directed and redirected; they can deliver messages or other information, make appointments or other commitments, and search databases. Telescript messages can change their contents on the fly according to feedback they get. For example, if an agent gets a refusal from Juan for "lunch on Tuesday?" it may select a response to the response, such as, "Well, how about on Wednesday instead?" Or it could acknowledge the refusal from Juan and try Alice instead. The number of conditions and alternatives is constrained by resources, not by the nature of Telescript.

Then there's Magic Cap, Magic's interface and application platform which allows people to use Telescript interactively with icons and a pen -- or a mouse or finger. It lets the user navigate through a village with a desk, a library, a post office and the like (the same idea as Time Warner, page 7, but of course with different specifics; globally, the desktop seems to be ceding to the local village). Magic Cap is only one of a large number of user interfaces which will fight it out in the marketplace; it is optimized for use with Telescript, but Telescript does not require it.

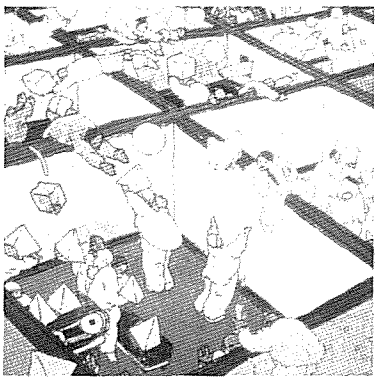
Most of Magic's partners will focus on devices with the Magic Cap interface; Motorola has announced its product already. On the other side, AT&T has announced a Telescript-based e-mail service called PersonaLink and a service platform for Telescript services (a shared industrial-strength Telescript engine farm for suppliers who don't want to build their own). So far, AT&T has a de facto exclusive on the service side in the US, and NTT has the same position in the less competitive Japanese telecom market. We expect to see announcements of corresponding services from PTTs in various countries in Europe shortly.



The conventional view of knowledge is of a substance that can be funneled into a learner's mind.



But IRL is exploring new ways to cultivate people's natural ability to learn.



Learning is a social activity that occurs in "communities of practice."

illustrations by Gary Lund
courtesy of the Institute for Research on Learning

WEDNESDAY: THE LEARNING ORGANIZATION

Learning is all about mental models, implicit and explicit.

John Seely Brown, Xerox PARC -- learning in real life

Workflows, rules and procedures that are too formal can stifle an organization's ability to innovate and learn. In some cases such structures can be very appropriate; however, often it is the invisible processes -- the informal narratives told over lunch or while troubleshooting a problem -- that aid in organizational learning. Drawing and making sense of the fuzzy line between explicit business processes and implicit work practice is where **John Seely Brown**, the head of **Xerox PARC**, has been spending much of his time lately. Brown views communities of practice (the social fabric built over time by people sharing a real work task) as the source of most organizational expertise, and he wants to help such communities thrive. Learning, in his view, is a distinctly social process and much less structured than many people think.

Narrative plays a starring role in such processes, as does creative play. That's why much of the work at PARC concerns informal communication and collaboratively created worlds, such as the LambdaMOO, developed by PARC's Pavel Curtis. (A MOO is a textual, object-oriented environment in which participants can instantiate and customize objects and interact with them -- and each other, of course. Future MOOs may well incorporate voice, video and other multimedia elements.) To help create, share and preserve artifacts such as stories, tools and skills, an organization must balance structure and design. It must also find a way to encourage participation, which is what sets the process in motion.

As Xerox's chief scientist and armed with a mandate to break the ancient barrier between PARC insights and Xerox products, Brown wants to put the theories to work. He wants to use them to change the design of collaborative technologies -- particularly for shared-work, organizational-learning and sense-making systems. He wants to create software resources that engage participants actively; that encourage discovery, interpretation and debate, which often begins informally with jargon and short cuts learned by hearing war stories and watching reenactments. Brown believes people involved in such work, which he refers to as communities of practice, often achieve a shared understanding that gradually emerges among the participants. In addition, the software should help blur the distinction between experts and novices by making complex concepts or structures easy to visualize, grasp and manipulate. But the technology need not be fancy to achieve these goals: Much of the benefit comes from tools that merely facilitate social interaction. Brown summarizes his efforts by saying, "I'm interested in creating environments that help us help ourselves."

Bob Epstein, Sybase -- database design for learning

"Legacy systems are anything that works," quips **Bob Epstein** of **Sybase**. But his vision is to enable people to build *new* systems that work -- and to keep changing them as their business changes. In a sense, Epstein wants to give people the ability to implement their learning in information systems. The means is design tools that represent business concepts in ways business people understand -- corporate hierarchies and lines of responsibility or dele-

gation, information flows, and all the data and relationships with customers, employees and suppliers that comprise a company's operations. All these must be represented explicitly and intelligibly so that business people can modify the executables as well as the models. (The Sybase embodiment of this notion begins with Enterprise Momentum, a model-based development suite. It also offers Build Momentum, an object-oriented graphical development tool; Deft, a CASE tool; and Gain Momentum, an object-oriented tool for developing multimedia applications for "volunteer" users.)

Epstein and his company are one of the few teams who may be up to the task. Since starting Sybase as a client-server database company in 1984, Epstein has consistently led the industry forward. With stored procedures, Sybase allowed logic as well as data to be managed on the server with integrity maintained; with Open Gateway, it supported cross-database interoperability and encapsulation of mainframe databases for integration with and manipulation by modern front-ends. A couple of years ago Sybase acquired Deft and then Gain to bring in some graphical design tool expertise; it also acquired SQL Solutions and Oasis to provide customer-oriented (and not necessarily Sybase-oriented) installation and systems-integration expertise. While other vendors were fussing with two-phase commit, Sybase came up with a better way to handle the problems of distributed database integrity -- replication. Epstein also came up with the notion of the volunteer user (**PC Forum 1993**) -- a customer, supplier or other outsider who can't be forced to use your applications but must be enticed.

John Hiles, Thinking Tools -- simulation as a thinking tool

Simulation is a powerful tool, because it exposes assumptions and reasoning as well as facts and data. But it's better for thinking and learning than for predicting. **Thinking Tools**, formerly the Business Simulations division of Maxis, attracted a lot of attention last year for SimHealth, its simulation of how a community might react to a variety of different systems for providing and allocating health care. The White House has used it and even comments favorably on it, as have a variety of public and private outfits including Congress's Office of Technology Assessment, the American Hospital Association, Kaiser Permanente, Procter & Gamble, Glaxo and Aetna.

However, no one has quoted its "results." One reason is that good simulations don't produce results that can be easily reported; they illustrate the complexity of systems that cannot be reduced to a couple of numbers. Ceo **John Hiles**, a modest man given to understatement, doesn't volunteer opinions on the health-care issue, but he will say one thing: "It's clear that any single, broad-based, comprehensive solution implemented over, say, less than a single president's term will create more problems than it solves. The situation is so complicated that the only way to change it without upheaval is incrementally."

Currently, Hiles is at work on a new system, TeleSim, which models the telecommunications market. The model so far includes mostly financial factors -- reflecting the audience for whom it was developed, mostly large phone companies. What are the trade-offs between stability and innovation? When a market is regulated, which vendors benefit, and which suffer? (Often, those who benefit are visible and vocal, while those who suffer are the unborn who don't get funding.) Which consumers benefit, and which other consumers pay for those benefits?

What are Hiles's conclusions about the "convergence" marketplace: For starters, flexible, "learning" companies have an edge. Early-entry strategies really pay off, and Fast adapters tend to get an unassailable early edge in markets such as local phone (or cable) service. Hiles's challenge is to make this message compelling to "slow adapters" in a joint marketing effort with Coopers & Lybrand. Says Hiles: "Big phone companies have an internal culture like hardware companies'. They talk about building and maintaining plant. But with digital switches, they have to start thinking like software companies...and they don't yet realize it."

The big issues in developing a simulation for non-techies revolve around the representation of the rules and data. Overall, it's an exercise in thinking, not in computing. First, you have to discern the factors that affect the system you're modeling, including unspoken or even unnoticed assumptions. In the health field, those include such things as the value of life, people's carelessness about other people's money and doctors' tendency to make tests if they're afraid of being sued. What are the relative costs and benefits of preventive vs. remedial care? Should people be responsible for the costs of their own behavior -- from careless driving to overeating, drinking and smoking? In telecommunications, factors are price elasticity, technology-adoption rates, internal cultures -- and of course, regulation.

Then you need a way to represent the affected system in all its complexity. SimHealth uses a town, with buildings representing hospitals, insurance companies, government offices, big and small businesses that grow or shrink on the screen. Ambulances pick up accident victims -- or don't, if the funds aren't there. Graphs show the portion of people's budgets devoted to health care or taxes, the percent of the population that's uninsured, illness incidence and other statistics. In TeleSim, various kinds of businesses -- from plain old telephone service to video-on-demand, on-line conferences, information services and wireless data communications -- grow and shrink as time passes. A market of many colors is competitive; one of a single color is a monopoly (natural or regulated).

The underlying technology, code-named WhiteBoard, is an object-oriented development system with agents modeled on those of SWARM, Santa Fe Institute's SWARM modeling environment used by artificial life guru Chris Langton.

PANEL: THE LEARNING ORGANIZATION

What distinguishes people from machines? Learning, which is sort of intelligence squared, or the ability to become more intelligent -- to assimilate not just facts but to recognize patterns, make generalizations and abstractions, and apply facts and rules in new situations. Learning means figuring out more than what you teacher told you; it is the extension of knowledge, not just the retention of it.

In particular, learning is the process of building new models inside your head. We like the Institute for Research on Learning's notion that learning is not pouring knowledge into someone's head, but rather an interactive process where models are constructed, tested, bent and sometimes even thrown out and replaced. You can do that by reading a book or watching a movie, but it usually works best in interaction with other people. Sometimes the models are explicit; much of the time they're inexplicit, more like patterns than diagrams. How much can software and other technical tools help? And how much is up to people themselves?

COMMENT: FRANK DANIELS III, NEWS & OBSERVER -- A VIEW FROM THE REAL WORLD

As an example of the learning process, we've invited **Frank Daniels III**, executive editor of **The News & Observer** in Raleigh, NC, which was founded by his great-grandfather Josephus Daniels in 1894. Daniels is an observer, but far from a naive one; he's executive editor of the News & Observer, and he's covered everything from the Norfolk, Virginia, waterfront to Kansas City high society. On the technology side, he's also an old hand: He set up and runs the N&O's NandO bulletin board, which runs on SPARCstations and Sybase SQL Server, with pc front-ends.

Aside from learning, he's here to show that content providers aren't just multimedia wizards, but journalists reporting on and from local communities. We like this model of what can be done with online services more than what the cable tv guys have in mind, although both will come to pass. We hope to hear from Daniels how our ideas would play in Raleigh, NC. And conversely, what can we learn from Raleigh, NC?

INTERACTIVITY: HELP US DESIGN RELEASE 2.0

In the past we have mentioned our intent to have a more visible online presence (**Release 1.0**, 12-93 and 1-94). This Forum session starts the interactive-design phase for this presence. Here are some questions we'd like to explore with you.

How should we mix the physical and virtual worlds? Could you have participated better in this Forum with different technological support? Would you like this conference to exist all year round in the virtual world?

What aspects of **Release 1.0** and the PC Forum would you like to see mirrored or improved in an electronic version? How much do you want to speak to other subscribers or be available to them? What kinds of conversations would you like to have with them and how often? Where would you like to receive the materials, and in what form? In your e-mail box? The online service you frequent most? Your voicemail? Neatly arranged in your structured information-sharing groupware system?

There are practical matters that could use improvement, too. Do you wish it were easier to re-use the materials we write (with proper citations, of course) in your own work? Should we make it easier for you to vacuum the resources and calendar sections into your PIMs?

Show, don't tell?

Should we stick to articles and conversations, or should we help you experience what we're writing about? How "live" should those demonstrations be? For example, Lotus' ScreenCam would let us send you a file to play that demonstrates some new software -- complete with our audio color commentary. But it's an inert clip. How much of the value comes from the interactivity?

Some of the Internet tools we have covered offer a degree of platform independence and display power, especially Mosaic (see **Release 1.0**, 1-94). Mosaic also offers a great and increasingly popular linking model, which can include links to live applications. But its limitations are still evident. How important are pointers and links; how should we implement them?

If we offered several different ways of participating, which would you take? Should we regard a service we start as permanent, or should we be reconfiguring it constantly in fits and starts as the platforms evolve? How patient are you? How adventurous? How much time do you have?

Easy lay-ups and shots to avoid

Some changes we can make are relatively obvious and straightforward. We should probably redesign the newsletter and broadcast it through a medium such as Lotus Notes. Some changes are easy to avoid: We probably shouldn't start a 900-number service called the Technology Friends Hotline. More seriously, we probably don't want to run our own online service or even a bulletin-board system. We're not an Echo or a WELL -- and we're certainly no Ziff-Davis. We're also mindful of our independence, which makes us loath to choose a single, exclusive channel.

That argues in favor of a horizontal, multi-layered presence -- and increased complexity. By horizontal, we mean it cuts across traditional service boundaries. The layers correspond to different features and different audiences. The simplest horizontal layer is clearly e-mail and its enhancements. Another layer might be the hands-on mockups or demos we describe above, or a discussion that spans bulletin-boards in three services. But that's difficult to do. How can we point to and participate in other discussions online and help weave them together? By the way, how do we protect our interest in these conversations, and how do participants protect their privacy? How do we avoid these avenues of communication becoming marketing channels? Or is marketing part of our community's interaction?

COMPANY PRESENTATIONS AND THE RUMPUS ROOM

Online interactivity doesn't happen only in chat rooms or conferencing areas. It happens everywhere, but to bring value and be profitable, it must happen within an environment that enhances everyone's experience. The company presenters at this Forum offer scaffolds and frameworks for such environments. Some offer inexpensive access (Metricom) to network activity. Others focus on information objects and make sure they are tracked (First Floor), queriable (Linguistic Technologies), viewable (Kaleida), published (Ziff), integrated (Taligent) and paid for (Wave Systems). A few address ways that people can enrich the information with links or annotations (DBA Software) and share it with each other (Collabra and Connect). Finally, some companies offer useful ways to support the systems (nett info and Corporate Software).

Several presenters offer their systems for hands-on use in our Rumpus Room. Taligent, whose Joe Guglielmi speaks on Monday's culture panel, is described above (page 5). Also above are four company presenters debuting at the Forum: Ziff-Davis Interactive, Connect, nett info and Collabra (page 15).

We'll also have the usual network of Notes machines implemented by Lante to stimulate offline discussions. Thank you, Lotus and Compaq, Visioneer and Proxima; thank you, Spry, Advanced Networks & Services and Lante!

Corporate Software -- support from a specialist

There are two views of software support: One is that it is an integral part of a software company's mission; it may even be the component that customers pay for after buying the initial software package at a loss-leader price. The other view is that it's a service best contracted out to a specialist, while the software vendor concentrates on building great software.

Mort Rosenthal has a vested interest in the second view, since his company, **Corporate Software**, is the largest supplier of outsourced software support, preparing to handle 2 to 2.5 million support calls during 1994. The premise is that Corporate Software is better equipped to handle support since most support calls concern interactions of hardware, system software, peripherals and applications rather than the intricacies of any particular application.

Most of the thousand people on the support phones at Corporate Software rotate from hardware through a variety of software, so they can provide the kind of wide-ranging expertise customers need. The support centers (in Boston, Dallas, Portland and Europe) have the support databases of all the vendors they handle (half of the top 10), plus all the latest in call-management equipment, with carefully designed procedures. Aside from that, since support is the primary business of this division of Corporate Software (the biggest single piece of its growing service business), morale is high since the employees are first-class citizens, not supporting-role drudges. In fact, notes Rosenthal, most of them are young and single, and the place has the "up" atmosphere of a college dorm. The company sponsors contests, promotes from within and does all the right things to make its people happy.

Says Rosenthal (who personally is better at sales than support), "My message to companies or to venture capitalists funding them, is: Why not outsource? Spending on support can be a real sinkhole -- and it's not even a software

vendor's primary mission. If you don't do support well, it's a huge problem; but if you do it well, it's still not going to make your company."

First Floor -- groupware for individuals

Frequently, the most advanced utilities appear as add-ons before they are absorbed into operating systems. Thus the operating utility business is one of the most dangerous, since every product success is susceptible to adoption by a larger, better-heeled competitors, while duds lose out right away. Nonetheless, **First Floor Inc.** is brave enough -- or foolhardy enough -- to offer in a discrete package functionality that really belongs in a network-based operating system.[5]

Recently founded by Sun's **Dave Cardinal**, First Floor (see **Release 1.0**, 12-93) will shortly launch a product that makes the file system look more like an object database, allowing users great freedom and power to annotate, classify and otherwise manipulate shared files. The system manages alerts whenever the content of a file has changed, and allows users to define due dates, priorities, access rights and various other attributes and permissions, using a cabinet and Post-It Note[tm]-style visual interface. For the more advanced users with automatable routines, it will have an API (in a future release) so that, for example, a workflow sequence can be initiated whenever a particular file is updated. More simply, a user can make a query to see all the spreadsheets that have been changed -- or the ones that haven't been updated, for that matter. Unchanged files could be highlighted for the appropriate users every Friday to remind sales managers to update their records, for example.

Many of these functions are currently accomplished by e-mail or workflow systems, but it's easier to annotate the files themselves. Indeed, all these capabilities should be in the operating system -- and eventually they will be. By then First Floor should be on the second floor, with a new set of products funded by sales of the first one. Its strategy, as opposed to its first product, is "snap+together" -- the idea that a single user can buy a groupware tool and get value from it, but that the value increases exponentially as several users snap their software together.[6]

Disclosure: Mayfield Software Partners (along with Mayfield Fund and Mohr, Davidow) is an investor in First Floor; Esther Dyson is an investor in MSP.

DBA Software -- groupware for databases

DBA Software (formerly Database Architects) similarly allows for the annotation of data, but at a more granular level. Its OLR System (originally On-Line Reference) is an annotation tool for legacy or new database applications built on DB2 or soon AS/400 and most SQL client-server platforms. It

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5 *Just consider the tribulations Stac has endured!*
6 *Another exponent of this approach is Beyond Inc., with an e-mail front-end that lets a single user automate his interactions with other e-mail users on any other e-mail system. But if everyone uses BeyondMail... Beyond was recently acquired by Banyan for $17.5 million. All the best, Chuck!*

allows for the easy addition of help text, documentation, annotations, instructions and performance support in general (see **Release 1.0**, 12-93). It works off a separate SQL database with its own object layer, forming connections and managing its own mostly text data separately from the base application. It attaches notes, documentation, comments and other annotations to any screen, field or individual record the database manages.

Ideally, of course, you'd develop your database applications with extra fields for annotations built in from the start. But the point of OLR is that anyone, even a user (good grief!), can add an annotation at any point -- exactly where the original designer didn't think to put it. Moreover, some items can annotate (or explain or document) the application, whereas others can annotate individual records. And ceo **Bill Braasch** notes, "Topics and notes may originate on a dictaphone (a doctor doing a diagnosis), a laptop or a connected desktop client. And it could flow out again over the telephone or radio, to a police dispatcher, for example."

In the case of OLR, most of the "interactivity" isn't in real-time between people, but just-in-time when someone needs it; the information/communication shows up as appropriate. Thus it allows interactivity connected to the content of daily work, rather than isolated in a "communication forum" or some special electronic place.

Kaleida -- more than portable multimedia

One view of what **Kaleida** is building is to see it as a platform-independent delivery vehicle for multimedia content. It helps developers script interactions between users and content. The business proposition is to make multimedia titles more profitable by broadening the available platform base.

Another view sees Kaleida's platform as a ubiquitous, virtual, network-aware interactivity platform, where inanimate content is only one of the things to interact with. Another is other people. Developers could use Kaleida's tools to turbocharge collaboration tools, online chat sessions, interactive games, MUDs and MOOs.

The key is in the flexibility of Kaleida's tools, as chief technical officer **Brad Beitel** (a 25-year IBM veteran), will explain. For example, ScriptX, Kaleida's multimedia development language, lets developers build their own application metaphors or environments, rather than constrain them to the one their authoring tool supports. Want your application to look and function like a stack of cards? a storyboard? a stage? Kaleida can oblige, and that's where things get interesting.

These custom environments can define various modes for interaction. One possible mode is virtual space, which contains 2D or 3D objects that you move toward or manipulate. As a proof-of-concept exercise, Kaleida created an underwater experience it calls Monterey Canyon that lets users interact with sea creatures in such a space.

Another possible mode for interaction is a modular publication that you set up to filter and format information for you. Yet another (Beitel and his colleagues have thought of several more) is multitrack, where the user can switch between several tracks, as in a baseball game with multiple cameras, announcers and data feeds. Or the tracks could be parts of an electronic-

ally enhanced conversation between people at different sites, such as audio, video and a data stream.

Linguistic Technology -- the language of daily commercial life

Long ago in 1975, **Larry Harris** founded Artificial Intelligence Corporation, which developed and sold the leading natural-language database interface, Intellect. Later, Artificial Intelligence began to focus on KBMS, an expert-system development and deployment environment, and ultimately merged with its chief competitor, Aion Corporation, to form Trinzic in 1992. Now Harris has founded **Linguistic Technology** and is back with his first love, natural language, and his new product, English Wizard. Whereas the old Intellect was a front-end for mainframe databases, English Wizard fits into the modern world of client/server. It can be a user's query tool, or it can fit nicely into most database front-ends to enhance the current query mechanisms: Instead of typing in a formal expression, the user can simply enter English sentences or phrases. The pricing should be under $100 a unit, says Harris, which leads to conclusions about distribution: via retail, and ideally in bundles with database/tool partners such as Microsoft (Access), Borland (Paradox), Gupta or Powersoft.

But another consequence is even more interesting: The product has to be usable by the purchaser, personally. Indeed, the real problem with NL front-ends is not so much the technology as the dictionary preparation -- figuring out the specifics of a particular data set and how its data are used. "We're committed to automating the dictionary construction," says Harris. Like much of "artificial intelligence," that boils down to a set of clever tricks that can do a lot of the work under the supervision of an intelligent, knowledgeable human. First of all, the system can determine much relevant information from the metadata -- table and column and row names. It can also deduce what the most interesting values and columns are, points out Harris, revealing one of the tricks (most of the others are proprietary): For example, if a particular field has 1000 different and unique non-numerical values, such as names, there's probably not much to say about it. On the other hand, if there are, say, 50 values, there may well be an associated category of interest: "Who lives in Georgia?" Or "How many customers live in Debrecen?"

In conjunction with the user, the system also establishes the proper verbs used to represent natural joins, such as customers *buy* products and *pay* invoices, while companies *hire* employees and *pay* salaries. It also handles complex, fairly typical queries that might not *seem* complex, such as "Who orders seafood?" -- which actually might require joining five separate tables: customers, orders, order detail, product table, category table. Or "How many customers order seafood?" -- which requires counting each customer only once, regardless of how many kinds of seafood it orders.

The base system includes a general thesaurus which provides extensive synonyms for common words, plus some generic knowledge about real-world issues such as dates, ages and birthdays. Separately, there's the possibility of content add-ons, such as a dictionary of synonyms for SIC codes, or dictionaries for industries or functional specialties such as medicine, law or project management. (Who's late? What is the real meaning of "tomorrow"?)

Metricom -- The all-you-can-eat data bypass option

Online-service subscribers are less likely to interact if their meter is ticking all the time, and access charges often make up a large part of on-line service bills. But it's hard to keep costs down when communications infrastructures require expensive interconnections. Wireless systems have especially high costs: They must pay for spectrum licenses and for access to wired networks, because most wireless services are wire-free only for the last hop between a local tower and the subscriber's terminal. Each radio tower connects to either a phone system or a packet-data network.

It makes sense that a wireless service might try to bypass the phone system and offer inexpensive, flat-rate local data communication services, and that's what **Bob Dilworth**, president and ceo of **Metricom**, intends to do. He's after the phone companies, not mobile packet-radio services such as RAM Mobile and Ardis. His data-transport service will offer unlimited local connections at a fixed monthly cost, which he estimates at $3 a month for 2.4 Kbps service, $10 for 14.4 Kbps and $20 for 56 Kbps. (Priority service, long-distance links and connections to outside networks will probably cost extra.) Considering that a 56-Kbps phone line can cost $400 a month, Metricom's service looks pretty attractive (see **Release 1.0**, 11-93).

Metricom avoids many costs that other services incur. For one thing, it uses unlicensed frequencies. Also, within a metropolitan area, its system is completely self-sufficient. Its transceivers, which are small enough to hang from a lamppost, find each other and establish continuous data links at effective rates of up to 50 to 60 kilobits per second -- much faster than the 2.4-11 Kbps effective throughputs that Ardis, RAM and other wide-area services will offer (and in fact competitive with today's fast consumer modems, which operate at 14.4 Kbps). The nodes are also intelligent enough to monitor link quality, report problems and find alternate routes.

Metricom isn't for everyone. It doesn't do real-time voice, it's not designed to operate at highway speeds and it has significant latency as packets make their multi-hop round trips. But its architecture is compelling, which Dilworth understood when he worked with radio modems at Zenith, which he left in 1987. So far, 14 utilities have created 19 networks using the system. Beta sites include Apple, Compaq, Lotus, Microsoft, Perot Systems and Stanford University. Paul Allen invested $25 million last year. Now Dilworth is on the road to raise $100 million -- and take Metricom nationwide. Allen and Microsoft will participate in the offering.

Wave Systems -- meter reader in a box

Peter Sprague, chairman of National Semiconductor, founded **Wave Systems** as Cryptologics in 1988 out of frustration with the lack of simple electronic feedback mechanisms that would allow vendors to charge their customers for usage, for example. Wave has developed a single-chip information-metering unit that should entice hardware vendors to OEM it by offering them a piece of the action. The Wave system's real promise is to dramatically lower the transaction costs of purchasing electronic items, regardless of what medium they are on (e.g., broadcast, CD-ROM or software disk).

The Wave Meter, which Sprague expects to price at under $30 (eventually closer to $10), acts much as a postage meter or phone-system debit card: A

user "loads" it by dialing into WaveNet, a service run for Wave by Digital Equipment Corporation. The user then authorizes a certain amount of money to be credited to the metering chip, which includes a unique identifier, some non-volatile memory and a decrypt-only DES engine. When the money's gone or a set time has passed, the user must redial for more dollars.

Each item for sale is encrypted along with a 64-byte tag, a service that Wave will initially provide. A buyer can get such an item through an online service, on a disk or CD-ROM or over the airwaves. She isn't charged until she tries to open the document or run the application. At that point, the Wave circuit decrypts and presents (or installs) the item for one-time or at-will use, depending on the arrangement. This means that documents offered for sale can be stored anywhere and distributed freely. The user is charged at the point of consumption.

Who'll do the wave?

Wave's technology should appeal to many audiences. If Wave achieves broad use and its vendors' offerings are priced right, buyers should appreciate the ease with which they can get commercial-grade electronic wares -- legally! Small royalties from many users can make vendors or publishers healthy returns. Publishers could change their price schemes, selling a CD-ROM for $10 and charging $.50 per page accessed, rather than a large lump sum for the entire disk. Software companies that can't get shelf space can use Wave to get better distribution and generate trials. And PC vendors should enjoy the opportunity for ongoing revenues, since Wave will offer them a portion of the 35 percent of revenues it receives as middleman. To achieve broad use, Wave will have to get hardware vendor support quickly. HP has committed to put Wave Meters in some upcoming platforms; Wave is in discussion with other vendors.

Wave's technology is similar to but potentially less expensive and more flexible than the CD-ROM-sampler approach. It offers sellers fine-grained control over pricing. Sellers could, for example, have prices that drop over time -- or escalate, as do airline fares. Wave's system also accommodates coin-operated systems, software rental or enterprise license management. (**General Magic**'s Telescript offers permits, which are another way to pay for goods and services. But this software-only system assumes a secure, pervasive communications-intensive service infrastructure.)

Cresting soon, on a platform near you

The Wave system has been in beta test for six months; Wave expects to start commercial operation next fall. National Semiconductor and VLSI have signed on to manufacture the Wave circuits. Personal Library Software provides a search engine for Wave-equipped CD-ROMs, and Dataware is modifying its search engine to do the same thing. Sprague, whose previous lives include stints as a UPI photographer, a chicken entrepreneur in Iran and managing director of Aston-Martin, will soon announce a project that uses Wave technology to enhance the network software-license management system written by Gradient for Novell. The project partners include Compaq, Dell, HP, IBM and Microsoft.

That's not all. Sprague is also starting the game-oriented Wave Interactive Network, a virtual arcade that can track game payments and scores. In prin-

ciple, Nike could sponsor a contest on the network in which people would compete against Michael Jackson in a video basketball (or baseball) game. The players beating Jackson's score would get Nike shoes. Most of the $8 million that Wave has attracted is from private investors; Sprague is in the process of raising $20 million more.

THE RUMPUS ROOM -- COME PLAY!

Near the company presenters we have a demo room, which is intended not only as a place to experience some of the richness of life on different nets first-hand, but also as a cross-pollination room, a place for people to blend ideas from one service with others and form interesting new concepts -- and profitable products or services. Think of the features in the systems on view here as memes waiting to be recombined.

The room will have half a dozen net-connected computers pre-loaded with client software and guest accounts for multiple online services. Several nearly impartial guides will break the trail, including **Echo's Stacy Horn**, **Release 1.0's Jerry Michalski** and **Internet Guide Brian Johnson**. We'll also have remote guides and kibitzers logged in across the network waiting to engage Forum attendees. Expeditioners will be able to trek through the following services.

- Major commercial services: **America Online**, **CompuServe** and **Prodigy**.
- Small-scale, Internet-attached, mostly community-oriented online services: **Pipeline** (with its custom software), **Women's Wire** (on First Class BBS), **Echo** (Caucus) and **The WELL** (PicoSpan).
- Multi-player games: the highly visual and arcade-style **Cyberstrike** from Simutronics (on the GEnie online service); the more varied and social **ImagiNation Network** from AT&T (formerly The Sierra Network); and the intricate, text-based and highly social MOOs and MUSEs on the Internet, including LambdaMOO, MediaMOO, ZenMOO and Cyberion City.
- A taste of the **Internet**, using the tools in **Spry** and **O'Reilly Associates'** Internet-in-a-Box (**Release 1.0**, 1-94) and a network connection courtesy of **Advanced Networks & Services**.

With the Mosaic client software that is part of Internet-in-a-Box, explorers can drop into the Internet Florist, the Xerox map server, the coffee pot and the Notre Dame and Kaleida webs. We encourage enterprising explorers to show off a few favorite places of their own. With other tools they can try Usenet news groups, list servers, the Internet fax and radio multicasting services (see **Release 1.0**, 2-94), the Electronic Newsstand and the Electronic Frontier Foundation's Gopher server. And, of course, no Internet experience would be complete without traffic jams.

Separate from the six multiply connected machines, several companies will offer more specific tours of services and possible service enhancements. **Pipeline's Jim Gleick** will show his user-friendly Internet interface; **Digital Ink's Donald Brazeal** will show what the Washington Post is doing on Ziff-Davis Interactive's Interchange. **Prodigy TV** will be available for a

test drive, as will **Intel's** ProShare desktop-conferencing system. And **Excalibur Technologies** will show its pattern-recognition systems, which might one day help us find snippets of text or fabric in the tangled webs online.

Excalibur -- managing the weather problem on the net?

Just as everyone talks about the weather, so everyone talks about the explosion of junk -- pardon us, of information -- on the net. How will we handle it? We'll send out clever agents or guard ourselves with text filters, but what about all the images and other stuff that's not explicitly classified? Ideally, we could scan everything ourselves, but it's more likely that content providers will start to index and classify the material themselves. Some might use tools based on technology such as **Excalibur's**, which recognizes images in carefully defined contexts. Although the technology isn't usable on a realtime basis yet, it could be extremely useful for information providers to classify content as a part of data preparation. For example, a film might be marked up to indicate when which actors are on screen, or photo clips could be categorized by background as well as by the name of the individuals in them: Madonna on horseback, Madonna in a bar, Madonna on stage, Madonna with unidentified male, Madonna with unidentified female, and so on. (Yes, some people would pay for that.) Also in realtime, an extension of Excalibur's technology could manage a camera tracking a particular individual, recognize objects in order to understand what a user is querying.

Ceo **Mike Kennedy** will demo everything from fingerprint recognition to how to tell the difference between Dr. Joel Fleischman and a moose, using clips from CBS's Northern Exposure.

Finally, several workstations will be running software from **Visioneer** (along with its scanner hardware, so you can add clip art to the Forum network) and company presenter **Collabra**. We encourage you to use these and the Notes workstations to enter your reactions to the general sessions and the systems you have tried -- and any ideas they provoked.

Similar, but different

One of our objectives in bringing these systems together in one place is to help you study their similarities and differences. Some functions from very different worlds are starting to look similar. Take browsing, for example. A few years ago, to browse your files you would issue a "cat" or "dir" command to your favorite command-line interface, for the Usenet news groups you would use a Unix news reader such as RN or TIN, and for bulletin-board messages you would scroll through service-specific software. Now Spry's Air News and the Pipeline and Prodigy bulletin-board browsers use similar principles -- as does the Chicago edition of the Microsoft file manager. Game technologies work their way into business products. That's why we're showing games next to chat rooms and desktop conferencing.

Some similarities are not obvious, and fade into assumptions about online systems in general. Although these systems look quite different, they all require participants to log in and out. Wireless links would obviate

logins; people could be in an online "place" all day. Some important differences may not be evident, such as the stated and unstated rules that communities follow, or the way conferencing-system interfaces affect the flow of conversation. Simple text interfaces can be powerful.

Three of the exploration machines will be open to unstructured use, with guides available to troubleshoot and suggest interesting venues. We will use the other three machines for guided tours to highlight the similarities and differences described above by focusing on uses for the technology. For example, we'll show different kinds of online customer support, we'll visit several publishing ventures and we'll see what tools are available for affinity groups and real-time chat. Along the way we will get a flavor for each service's editorial policy, content and level of activity.

COMING SOON

- *Software componentry.*
- *Multiplayer games.*
- *Structured documents.*
- *What's a 'zine?*
- *Voice and wireless stuff.*
- *Software for education.*
- *And much more... (If you know of any good examples of the categories listed above, please let us know.)*

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